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CARNIVOROUS PLANT NEWSLETTER

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CARNIVOROUS PLANT NEWSLETTER

Official Journal of the International Carnivorous Plant Society

Volume 13, Number 3
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COVER PHOTOS

FRONT: *Cephalotus*. Grown by Ray Triplett, photographed by Joe Mazrimas.

BACK: CPN Co-editor Joe Mazrimas pollinating *Sarracenia* in his backyard. Photo by Jim Mazrimas.

The co-editors of CPN would like everyone to pay particular attention to the following policies regarding your dues to the ICPS.

All correspondence regarding dues, address changes and missing issues should be sent to Mrs. Pat Hansen, 3321 Hamell Rd., Fullerton, CA 92635. DO NOT SEND TO THE CO-EDITORS. Checks for subscriptions and reprints should be made payable to CSUF FOUNDATION-ICPS.

All material for publication, comments and general correspondence about your plants, field trips or special noteworthy events relating to CP should be directed to one of the co-editors. We are interested in all news related to carnivorous plants and rely on the membership to supply us with this information so that we can share it with others.

Views expressed in this publication are those of the authors, not necessarily the editorial staff.

Copy deadline for the March issue is January 1, 1985.

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News and Views

RON GAGLIARDO (1216 Cooper Dr., Raleigh, NC 27607) mentions that as many CP growers know, it is often helpful to add a bit of limestone to soil mixes for Mexican pinguiculas. However, it is difficult deciding how much to add. Recently, he tried something a little different. Instead of mixing the usual sand, perlite or vermiculite to peat for drainage, he used 50% crushed coral and 50% peat. He obtained the crushed coral from the aquarium shop where he works; it is normally used as a substrate in marine aquariums. The coral provides good drainage and contains lime which is slowly released and keeps the pH up. He has been growing *P. moranensis, P. gypsicola* and *P. agnata* in this mix for over a year with great success. In addition, he has also had some success with *P. agnata* and *P. gypsicola* in 100% crushed coral.

JOHN LADNIER, Botany Bay Botanicals, 112 Deborah Dr., East, Mobile, Alabama 36619 writes that increased draining and filling is occuring at an alarming rate in the pitcher plant savannahs and bogs around Mobile Bay. He has begun to rescue plants in an effort to start a nursery for preservation of *Sarracenia* species and other CP. He would be willing to send rescued plants of *mature* size to any students or institution interested in studying, preserving, and conserving these plants and their habitats. This offer would also include high schools or institutions of higher learning. John asks that requests for plants send either $5.00 or $10.00 to pay expenses of collecting and shipping the plants. The collections sent would contain *at least* two species of *Sarracenia (S. rubra, S. purpurea, S. leucophylla, S. alata, S. psittacina,* and hybrids), +*Drosera*

SEED BANK

Patrick Dwyer (St. Michael's Episcopal Church)
49 Killean Park, Albany, NY 12205

Byblis liniflora; Darlingtonia californica; Dionaea muscipula; Drosera acturi (10), *D. auriculata* (15), *D. binata, D.binata dichotoma* (10), *D. burmannii, D. capensis, D. capensis* (narrow leaf), *D. capensis* mix, *D. capillaris, D. capillaris* (giant) (1), *D. dielsiana, D. filiformis filiformis* (5), *D. gigantea* (1), *D. glanduligera* (7), *D. hilaris* (1), *D. indica, D. indica* (red flower), *D. intermedia, D. linearis* (3), *D. menziesii, D. montana* (4), *D. montana* (white flower) (1), *D. peltata; Drosera pygmaea* (10), *D. rotundifolia, D. spathulata. D. spath.* (Kansai), *D. spath.* (Kanto), *D. spath.* (white flower), *D. trinervia* (1), *D. whittakerii* (3), *Drosophyllum lusitanicum* (10); *Nepenthes khasiana; Pinguicula vulgaris* (10); *Sarracenia alata* (1), *S. flava, S. leucophylla, S. leucophylla* (red), *S. psittacina* (2), *S. purpurea purpurea, S. ×chelsonii ×purpurea* (3), *S. (oreo ×purp. venosa) ×purp. purp.* (2); *Utricularia subulata* (5).

It is the responsibility of persons ordering seed from outside the U.S. to be aware of and to comply with any regulations regarding shipment of seeds to their respective countries.

$.75 each. For details on sending or ordering seed, see *CPN*, March, 1984, page 3.

CHANGE OF ADDRESS

MILINGIMBI NURSERY has changed its address to:

69 Pringle Ave., Belrose, NSW 2085
AUSTRALIA

tracyii and *D. capillaris, +Pinguicula lutea* and *P. planifolia.* The more money you send, the more plants you will receive; and remember, the plants will be mature. Sarracenias will be cut back, dormant rhizomes.

JOE MAZRIMAS reports that he has about 30 books left of CARNIVOROUS PLANTS by Gordon Cheers for the price of $7.95. After these are gone, there will be no more reorders. If you're thinking of giving a gift to a friend for a birthday or the Christmas holidays, this would be a unique present. This is your last chance to do so.

I was a long time correspondent with Peter Tsang and I will surely miss him and his ideas and enthusiasm about everything, especially carnivorous plants. He contributed several articles to CPN in the past:

A new Drosera from the topend of Australia. CPN 9 (2): 46-48 1980

"CP growing the unique way—report from down under" CPN 9(3): 71-75 1980.

The first report deals with a description and photo of a new species of Drosera with a pink flower. The second article describes a novel way of growing CP and fish at the same time with benefits to both. We were looking forward to many more of his ideas but now he will be a refreshing memory in our minds of just a nice guy helping us understand the ins and outs of CP.

LEN & SANDRA McCANDLESS (109 Woogaroo St., Goodnia, 4300 QLD. Australia)

On May 29th, Peter Tsang passed away because of a brain tumor. Services were held at Kenmore and he was buried at the Pinaroo Lawn Cemetery at Mt. Gravatt (a suburb of Brisbane). We were helping to put his estate in order when we found some of your past correspondance and thought you would appreciate knowing what happened. Many of his friends were not aware of his sudden death until after the funeral since the person looking after the funeral arrangements did not know their names and/or their addresses. The executor of the will did not know what to do with his plants, so she donated them and his extensive fish collection to the local Botanical Gardens. Unfortunately, Peter had been looking after some $2000 worth of plants belonging to some of his friends, some living up to several hundred miles away. Even after receiving lists of the plants concerned from the rightful owners, the Gardens have more or less stated that the plants belong to them and nobody will get their plants back. A lot of our plants were in that collection also.

STEVE SMITH (1159 Trim St., Kirkwood, N.Y. 13795). If anyone should get aphids or other pests on *Heliamphora,* DO NOT use insecticidal soap on them. The pitchers will dehydrate and dry up. Its best to use ½ strength Malathion solution as it shows no ill effects.

The *Sarracenia purpurea* plant from upper state New York which was supposed to be the yellow-flowered mutant is not that at all. This plant shows red tint on the young pitchers and has a red flower.

GUNTER ZIPFEL (Borchertring 78, 2000 Hamburg 60, West Germany). I have a question about the list of CP books in the March issue of CPN. Book number 13: *Carnivous Plants,* Randall Schwartz and book number 16: *Cultivating CP,* Allen Swenson are no longer available and are out of print. I would like copies of these books and so I am asking if anyone knows where I could obtain copies. (Please notify Joe Mazrimas on a source for the above books.)

CP Articles Solicited

The editors of CPN would like to remind ICPS members that the publication depends on *their* contributions. Letters, articles and photos (both slides and black and white prints) are suitable material for submission to CPN. Material should be submitted to one of the co-editors (names and addresses listed inside the front cover).

Tedious Trudge Through The Torturous Turmoils of Taxonomy

by
John Turnbull and Anne Middleton
A.I.N., 16 Waverly Dr., Guelph, Ont., N1E 6C8, Canada.
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The naming of things is a fundamental aspect of human communication. We often do it spontaneouly, adding adjectives and descriptors to common names for objects to indicate a specific item from a larger group. For example, if you are working on your car you might ask a friend to pass you the 'fat wrench'. This name might be adequate given the limited size of your tool kit. However, the same 'name' would not be expected to work if used in a well stocked hardware store. Clearly any given object may have more than one name. The best name to use at any time is determined by the needs and circumstances of the communication. As collectors and growers of CP we have a variety of plant names at our disposal. Some, like the fat wrench example above, are informal spontaneous names that remain associated with a plant only until the label is lost or the ink fades. However, some informal sounding names are in fact quite legitimate horticultural "Fancy Names." These names are governed by a completely different set of rules which will not be discussed here. Other names exist which are Latin, very formal sounding, i.e. hard to pronounce, and seem to be attached to a bewildering assortment of objects: botanical species, natural and horticultural hybrids, and groups of plants with no real status whatsoever. The main problem is the fact that there are many different kinds of names designed for different purposes. These have been created at various times in history and each author had different motives for creating a new name. By contrast the discipline of nomenclature, the study of formal naming, has evolved fairly recently. The net result is that when a name is used in an inappropriate context it creates confusion rather than clarity, regardless of how 'formal' or valid it may be in a different context. Unfortunately, there is no reliable way that the function of a name can be assessed by inspection.

The important point to recognize is that all of these different names are either botanical names themselves, or are modifiers which are attached to a correct botanical species name for one reason or another. Therefore, the correct botanical species name can be considered basic. The proper formation and use of these names is governed by a complex body of rules which are reviewed and revised at an international meeting every four years. The scientists who derive and are governed by these rules are called taxonomists.

One of the basic tenets of botany is that each recognizable group of similar organisms—a species—must be assigned a single "correct" name that belongs to at least two higher "ranks" of relatives: the genus and family. The combined name consisting of a genus name and a species name is often called a binomial. By extension, two recognizably different groups must not be known by the same name. This lofty principle, so simple and elegant intellectually, is persistently difficult to translate into real world. This is primarily because the concept of the "recognizable group" is indefinable and subjective. Any newly proposed species can only be delimited by comparing and contrasting all of its characteristics with those characters known from other recognized species of the same genus. In publishing a new name, an author is only expressing that material exists which, in his

opinion, cannot be assigned to any other accepted species known to him. If the original publication meets the minimum standards for format, content and distribution (as set down by the International Code of Botanical Nomenclature) the species is said to be "validly published." The new name becomes "legitimate" at once and is assumed to be the "correct" name for the species until successfully challenged in the press. The challenge may come swiftly, particularly if the newly proposed species appears to be identical to another species that the original author did not consider. Alternatively, the new name may remain stable through generations of publications and through repeated use become accepted. Nevertheless, even well established names may be challenged. With the passage of time new material is collected and new knowledge about the characteristics of a species, and others with which it could be confused, becomes available. This accumulation of information then modifes the concept of "recognizability" and alters the perception of the species boundaries, which may require nomenclatural changes.

The above discussion of a species is of the type used by plant taxonomists when involved in their work. The study material is primarily dried plant specimens stored in herbariums (museums for dead plants). Confusion exists because other people (zoologists, botanists in other fields of study, commercial plant growers and hobbyists) use the same terms and names but define them differently. As a reader of CPN you will be better able to utilize the product of taxonomy correctly if you have an understanding of how this discipline is wired up and motivated. To do this we will be drawing examples from the genus *Nepenthes*. In the 230 year history of this genus over 200 legitimate names have accumulated of which about 70 are currently recognized as "correct." Sufficient examples of controversies, errors, reversals, and altercations have occurred to make the topic fun to discuss. The same could be said of the genus *Drosera*, but in our opinion that unwieldy group is almost too "interesting" for a paper of this size.

Recognizable Group

Are there such things in the real world a "recognizable groups" of *Nepenthes*, or are we dealing with a relatively small number of extremely variable species which have been assigned an inordinate number of names? Danser (1928, pg. 403) grappled with this problem and concluded that good specimens of closely related groups such as *N. albomarginata* Lobb, *N. gracilis* Korth., and *N. reinwardtiana* Miq. could be consistently differentiated from each other after careful study of the available material. In short, they were recognizable. Realizing that not everybody who was interested in *Nepenthes* would have access to good herbarium material for comparison, Danser published a series of consistent species descriptions which set the boundaries of each species as he perceived them. This type of publication is called a "monograph" or a "revision" and is the reference used by professionals when identifying a species. From our own field work, we would tend to agree with most of Danser's assessments. Some individual species of *Nepenthes* are remarkably polymorphic, but the observable variation in most cases does not overlap with that of another "correct" species. For example, *N. gracilis* can be found in Sumatra, the Malay Peninsula, Singapore, Borneo and Sulawesi, and the appearance of individual plants is variable. We even encountered variations which have not yet been documented in existing descriptions. It does not appear possible however to determine the geographical origin of a *N. gracilis* specimen by any combination of characters. This indicates to us that the observable variation is distributed throughout the known range of the species. The material we collected will produce a better understanding of the group, rather than demonstrating that the group was improperly delimited originally.

There are two observations which would seem to contradict the concept of the recognizable group in the Nepenthaceae. Firstly, most *Nepenthes* species can hybridize freely with other species, producing fertile offspring which will also freely cross. Secondly, pure seed from a single species mating produces offspring that are exceed-

ingly variable. We shall now explore these ideas more thoroughly.

Without question, some of the "correct" species names that we currently use will prove to be hybrids. *Nepenthes hookeriana* Lindl. was originally described as a species, and is now generally accepted to be a commonly occurring hybrid between *N. ampullaria* Jack and *N. rafflesiana* Jack. This realization does not modify the validity of the original publication, despite the fact that it was apparently based on an incorrect assumption. Only the rank of the name changes, and is now best referred to (under those conditions that require absolute precision) as *N.* × *hookeriana* Lindl. *(pro. sp.) emend.* Macf.. You can still get away with "*N.* × *hook.*" in the privacy of your own greenhouse, as the correct name won't fit on a reasonably sized label. The fact that a given hybrid may occur commonly is largely irrelevant if it has only been collected from areas where the range of both parents is known to overlap. It would appear that some insect pollinators which service two species frequently confuse the flowers of the plants in the field. If some insects are appallingly poor taxonomists, should it really degrade our perception of the status of the parents? Surely insects and humans view the universe quite differently, and we need not be restricted by their observations until they choose to publish.

The second objection to the concept of the recognizable group (regarding the surprising variability of plants from pure species seed) would appear to be more vexing. Firstly, it is quite possible to achieve very high survival rates for seed germinated in a greenhouse—well in excess of what can be expected in nature. It seems quite probable that some of the variants seen in the nurtured seedlings might not survive in the harsher conditions of the field. Greenhouse observed variations then gives us additional data on species variations more quickly (and possibly more economically) than field work, but whether it deserves the same level of distinction as data from the field is open to question. As stated earlier, when new information from any source alters the perception of a species boundaries, nomenclatural changes may be warranted. Experimental taxonomy is an important discipline, and can answer some questions that purely morphological observations do not completely resolve. Undoubtedly, everybody would be much more comfortable with the conversion of *N. hookeriana* from species to hybrid rank if the decision had been based on the observations of the appropriate cross. Nomenclatural changes would be required if it were found that seedlings from a single species mating or controlled interspecies cross consistently gave rise to small numbers of individuals which would normally have been identified as another validly published species.

Characteristics

If we can now agree that there are recognizable groups of *Nepenthes* in the wild, what characters are most acceptable to separate one group from another? On pages 255-6 of his monograph, Danser discusses the various characters he used: the shape of the pitcher's peristome, spur and lid; distribution, size and shape of glands; type of leaf base; leaf shape and veination; distribution and type of hairs; and flower form. These all appear to be more consistent within a group than pitcher colouration, leaf or pitcher size, and internode length—all of which appear to be environmentally controlled. No single character was found to be uniformly useful throughout the genus. This is not to say that the latter features are valueless, or the former will always prove useful. Notice that all of these features are morphological characters which can be easily tested on either living plants or herbarium specimens using simple equipment (i.e., hand lens and ruler). Characteristics which can only be measured or tested using elaborate equipment or requiring living specimens are admittedly a source of interesting data, but are not universally applicable and are therefore of less value taxonomically.

Taxonomy is not like the practice of law. Precedents play little part in delimiting a new species. Arguing that a specific character, say peristome shape, is variable in one species, or is useless in differentiating

species "A" from species "B" and "C" does not necessarily make it unreliable when considering a species "D" as it relates to "B" and "C". One cannot work by formula. Experience with the genus does allow you to perceive differences more quickly, but the recognition of a new group is usually a slow process. Usually you become aware that the material under consideration is somehow "odd"; it does not fit the pattern of the other species studied. In an attempt to identify the material, you can generally eliminate most of the other species in the genus, bringing the selection down to two or three possible names. If you still cannot assign the new material to an appropriate group using the descriptions available you must then consult the actual herbarium material that had been the basis for the descriptions you had been using. Descriptions are a useful tool for identifying good specimens, but when you are faced with damaged material, or specimens that might represent a new group, they are not adequate. Only when you are satisfied that the material under consideration does not belong to an existing species do you start to clarify the feeling of "oddness" into a list of measurable or describable characters that, in your opinion, delimit the new species.

Publication

As we have already demonstrated, the products of nature cannot be judged by any set procedure or formula. The works of man can be. The formal publication of a new species name must follow a strict set of rules if the name is to become legitimate. Who then is entitled to publish? The answer is anybody—without regard to academic qualifications. There are abundant examples in the field of taxonomy where skilled amateurs have made significant contributions, while scientists with impeccable credentials have made blundering errors. Most biological publications do not make any reference to the academic status of the author(s). The work is to be judged solely on its content, not personal reputations.

A good example of a species introduction is *N. clipeata* Dans., published in Danser's monograph on the Nepenthaceae (pg. 280-2). Danser did not personally discover this species in the field. The original material that he worked with was a single collection of plants made by a Dutch botanist (B. Hallier) who had led an expedition through western Borneo in 1894. The collection consisted of only nine herbarium sheets all identified as #2344. These sheets are so outrageously different in appearance from all other described species of *Nepenthes* that one cannot imagine Danser spent too much time agonizing over whether he was justified in naming them. The disc-shaped leaves, with the pitcher bearing tendril inserted at their midpoint are features exaggerated to a degree unknown in any other species. Having satisfied himself that he was in possession of material representing an unknown species, what procedure did Danser follow to introduce and stabilize a new name?

The description itself is in Latin and starts with the proposed binomial, author's name (often abbreviated) and a statement of taxonomic rank: "*Nepenthes clipeata* Dans. *spec. nova.*". This is followed by a list of all the known references or illustrations previously published referring to the proposed species. In this case, Danser had previously discussed and illustrated Hallier's collection in an earlier paper but made no attempt to name or formally describe it (Danser, 1927). The references are followed by a brief (less than 100 words) Latin description of Hallier's material only. These nine sheets are then called the "Type Collection" and are adequately identified as such in the publication. This particular description is unusually brief. As mentioned earlier, there was very little material to describe, and the plant was so outrageous that a long wordy description was not needed to delimit it from all other known *Nepenthes*. The Latin description, along with the accompanying illustration, is the official type description for this species. The main purpose of the type description is to make it possible to replace the type collection with suitable material should the original material become lost or destroyed.

The next element in this publication is a modern language (in this case English) description of the plant. This section is optional, and is called an "expanded" or

"species" description. Here the author is free to speculate more on the material at hand, discuss other specimens that he believes are also of the same group, and mention any other data that is not specifically apparent in the type material. Specifically, Danser describes *N. clipeata* as "not climbing." This is a statement that he could not know, as uncollected parts of the plant may in fact climb freely. This point is not a criticism of the publication, because this type of mild speculation and educated guesswork is appropriate, particularly when a species is described from a small amount of oiginal material. The expanded description is meant to act as a guide for other botanists and students who lack Danser's accumulated insight into the genus. For practical purposes, it is this description which is used to identify new material. The final section of the paper is the discussion. Here the author has complete freedom to discuss the new species, speculate on how it may be related to other members of the genus, and introduce any final item (such as growth habit or ecological data) which might also be available and of interest to readers.

Danser's description of *N. clipeata* meets and exceeds the minimun standards for effective publication and distribution. This has some important ramifications. The name *N. clipeata* (along with the author's name), the type collection (Hallier #2344) and the Latin description become permanently fixed, and must be dealt with by all serious students of the genus. A legitimate name can never "go away" or be separated from its type material. It is interesting to note that at the time that a new species is first proposed, it is in fact most poorly understood. It is quite possible that Halliere's collection is not truly representative of the species as it exists in nature. Other populations of the same species may be found which demonstrate that the original material was dwarfed by the harsh environment (it was collected from a cliff face). This discovery would not affect the status of the type or the Latin description, but would probably necessitate a major revision of the species description.

Challenges

In the introduction we stated that over 200 legitimate names of *Nepenthes* have been published, yet only about 70 are currently accepted as correct. Since a legitimate name can never be disposed of, what heinous crimes were authors guilty of to have their creations considered less than correct? It is important to keep the concept of the name, which is governed by rules, separate in your mind from the concept of species, which is a measure of recognizability. Errors in either the formation of the name or the delimitation of the species force nomenclatural change. Most of the names which are now combined with others were originally proposed because poor communications allowed people to reuse names which had already been published. These names are known as "homonyms" and are permanently frozen when discovered. Further problems were caused by simple mis-interpretations of the brief inadequate descriptions normally published at earlier times. Both the surprising variability of the genus and the quite different appearance of upper and lower sections of a plant caused confusion. People often mistakenly believed that they possessed something new when they did not. These names, known as "synonyms," are also frozen upon discovery but, unlike homonyms, can occasionally be dragged out, warmed over, and served up for consumption by the botanical public. Some examples follow.

Korthals was the first person to publish validly the binomial *Nepenthes bongso* Korth.. In 1839 he applied it to a plant that is still recognized as a real species. Unfortunately, the publication that he used did not remain readily available to all interested parties, and the name proved to be unusually popular.

In 1908 when Ridley undertook to report on the Malaysian plants collected by two other botanists, he simultaneously named and described what he felt were two unique *Nepenthes: N. gracillima* Ridl. and *N. bongso* Ridl.. Danser later decided to unite these two species. Under normal circumstances he would have been free to choose either of the names for the combination. In this case, the choice was limited as *N. bongso* Ridl. was a later "homonym" for *N. bongso* Korth.. The

combined species could only be called *N. gracillima* Ridl.. Notice that Ridley's name remains with the binomial, not Danser's This is because the type specimen (which Ridley described as *N. gracillima*) remains as an integral part of the newly combined species. All material that had been previously called *N. bongso* Ridl. would be redetermined as *N. gracillima* Ridl., but the type specimen of *N. bongso* Ridl. would remain the type for that name. The name itself is permanently frozen. Even if the status of *N. bongso* Korth.were changed, *N. bongso* Ridl. would remain an unusable homonym.

A similar case had its beginnings in 1911 when Guillaumin was confronted with what he felt was a new species from New Guinea. He also independently dreamt up the name *N. bongso* Guill. and applied it to his new taxa. Danser did not agree that *N. bongso* Guill. was sufficiently different from *N. vieillardii* Hook.*f.* to warrant its exclusion from that species. He combined them under the oldest valid name, *N. vieillardii* Hook.*f.*, and *N. bongso* Guill. became a synonym. For the same reasons cited above the original author's name, in this case J.D. Hooker, remains with the valid binomial, and Guillaumen receives almost no credit for his work.

In the two cases above, Danser supplied a new complete description of the proposed combination. This is called a revised description. Another option he had was to write a species diagnosis. This is a minimum list of the characteristics which separate the combined species from all others. These diagnoses and descriptions are used to identify new material and are generally more useful than the original Latin type description. It is important to understand however that the original decision to combine the two species was based on a comparison of reliable herbarium material, not by a comparison of published descriptions. This is the only acceptable procedure for nomenclatural changes. Descriptions are too open to misinterpretations and are therefore not comparable. If the union of two species required considerable alterations in the description of the combined species, Danser could have signified this by the addition of his name in the following manner: *N. gracillima* Ridl. *emend.* Dans; or *N. vieillardii* Hook. *f. emend.* Dans.. This would only be done where the combining author feels that the original published description was flawed or in some way misleading and that future workers would be best advised not to use it. The nature of the flaw would need to be explained.

Danser was not the first person to recognize the species we now know as *N. papuana* Dans. as unique. The species was first named *N. neoguineensis* Ridl. in 1916. Unfortunately, Ridley did not realize that MacFarlane had already utilized that binomial in a description of another New Guinea plant in 1911. Ridley's name was not valid because it was a later homonym, but his assessment of the species was vindicated by Danser. This presented a problem as there was now a published recognizable group, without a name. Danser resolved this by proposing an "avowed substitution" which is a new name applied to an established species (*N. papuana* Dans.). He described the plant, and his name, not Ridley's is used as the author. Ridley's type material automatically becomes the type for the new name also. Ridley was deprived of most of the credit for the find, by virtue that he had not done his nomenclatural homework adequately. Most people would erroneously assume that it was Danser who first named the plant, and recognize its status.

None of these combined species need be permanent.The *N. edwardsiana* Hook.*f.* : *N. villosa* Hook. *f.* controversy has created a paper blizzard of memorable proportions. Off to a shaky start, J.D. Hooker described *N. villosa* in 1852, and seven years later introduced *N. edwardsiana,* noting that it might be a mature form of the earlier species. In 1895 Beck formally combined the two species under tlte oldest name. The fact that the original collectors (Low, Burbidge, and St. John) had seen the plants in the wild and considered them to be different species, was ignored. Macfarlane split *N. edwardsiana* out of *N. villosa* in 1908 only to have it promptly re-combined by Danser

in1928. Danser argued that the "edwardsiana form" was typical for the species, and the "villosa form" was more specialized, flowering in the juvenile state. Recently, Kurata re-split the two species based on field studies and by reference to the original descriptions (Kurata, 1976). Is the controversy over? Possibly, the situation seems satisfactory, but one never knows when the editorial artillery will be reloaded and fired. You can see from the above why a name can never be discarded, and why it must be associated with an author. Each name may form a part of an interlocking puzzle which can only be unravelled and understood if all of the pieces are present. If Beck had been entitled to obliterate permanently the name *N. edwardsiana* Hook.*f.* back in 1895 it would have created unnecessary confusion later.

When you accept that there is only one authentic specimen of each species, and it is the dead, dry type specimen, the problem of understanding taxonomy becomes easier. All other plants, either living or dead, have only been assigned the same name as the type material that they most closely resemble. In practice, this assignment is usually made by comparing the characteristics of the unknown plants with the "best" published descriptions. Revised descriptions are only a guide to show what additional variation and features have become associated with a species name in the opinion of a particular authority. Ultimately, one must decide for himself which set of available descriptions is most uniformly useful, and therefore "best".

Bibliography

Danser, B.H. (1927) Indische bekerplanten. De Tropische Natuur, XVII (1927), p. 197-205 fig. 1-11 *et tab. colorata.*

Danser, B.H. (1928) The *Nepenthes* of the Netherlands Indies In Bull. Jard. Bot. Buitenz., serie III, Vol IX, Livr. 3-4.

Kurata, S. (1976) *Nepenthes* of Mount Kinabalu, Sabah National Parks Publ., Kota Kinabalu, Sabah, Malaysia.

Macfarlane, J.M. (1908), Nepenthaceae; *in:* A. Engler, Das Pflanzenreich, IV, III (Heft 36).

ADVERTISING INFORMATION

All copy must be submitted prior to deadline to Pat Hansen, 3321 Hamell Road, Fullerton, CA 92635. Deadlines for each issue are as follows:

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SUNDEW AS OFFICINAL PLANT

As the label shows, sundew is not just an object of demonstration in schools or a piece of collection of someone interested in CP but also an officinal plant. In CPN Vol. 9, Number 2, Reinhard Frenzer has already suggested a use of the plant as cough drops. Bioforce Ltd., a firm at Roggwil near the lake of Constance, Switzerland is using sundew extracts in one of its cough mixtures.

The plants *(Drosera rotundifolia)* are collected by youngsters in the north of Finland every summer. There are 29 of them in Ylkiiminki for example. In the year 1980 they found 166 kg of *Drosera* in that area which then were immediately sent to Zurich by aeroplane. The plants have to be processed in fresh state. At Roggwil the plants are laid into cold, 43 percent alcohol in order to detach the contents. Subsequently the contents are pressed, filtered and the alcohol withdrawn. Then the product is analysed in a laboratory and finally filled into bottles of 200 or 500 ml together with other extracts.

Tests have proved that some sundew contents called naphtochinone stop certain effects of enzymes and a cramp-loosening as well as a growth-hindering effect for germs like Staphylokokkes, Streptokokkes and Pneumokokkes.

The label says:
Drosinula Bronchial-Syrup
Fresh-plant preparation, excellent medicament for catarrh of the respiratory organs, such as obstruction through phlegm, hoarseness or coughing irritation; highly efficient also refractory cases.
Dosage: Adults, 1-2 teaspoons, every 2-3 hours, Children, ½-1 teaspoon, every 2-3 hours.

Drosera has achieved growing significance as an officinal plant. Because of an insufficient supply of *D. rotundifolia* one often uses *D. madagascariensis* instead.

I have been told that *D. rotundifolia* is in no way endangered in those areas. This is the official version; perhaps another member of CPS can tell us more about the situation.

Drosinula
Bronchial-Sirup
Sirop pectoral
Frischpflanzenpräparat mit Extrakten aus Sonnentau, Tannenspitzen, Alant, Ipecacuanha, Efeu und Honig.
DROSINULA Sirup ist ein bewährtes Mittel bei Katarrhen der Atmungsorgane wie Verschleimung und Husten.
DROSINULA Sirup dämpft den quälenden Reiz und löst den zähen Schleim, fördert den Auswurf und erleichtert die Atmung. Zusammensetzung und Dosierung der einzelnen Wirkstoffe gewährleisten eine optimale Behandlung auch in hartnäckigen Fällen.
Dosierung: Erwachsene alle 2-3 Stunden 1-2 Teelöffel voll. Kinder alle 2-3 Stunden ½-1 Teelöffel voll.
Zusammensetzung/Composition: Inula helenium ø 2.1%, Hedera helix ø 0.55%, Uragoga Ipecacuanha ø 0.55%, Drosera rotundifolia ø 2.1%, Coccus cacti ø 0.05%, Succus Turioni Pini 18.93%, Succus pyri comm. 22.71%, Saccharum crudum 30.3%
IKS/OICM No. 32043011
200 ml
Préparation composée d'extrait frais de Drosera, de bourgeons de sapins, d'aunée, d'ipéca, de lierre et de miel. Le sirop DROSINULA est un agent éprouvé dans les catarrhes des voies respiratoires tel que l'engorgement bronchique et la toux irritative.
Sirop DROSINULA calme l'irritation aiguë, détache les mucosités tenaces, favorise l'expectoration et facilite la respiration. Chacun des principes actifs est dosé de façon à procurer au produit des propriétés therapeutiques optimales, même dans les cas rebelles.
Posologie: Adulte: 1 ou 2 cuillerées à café rase toutes les 2 ou 3 heures, enfant: ½ ou 1 cuillerée à café rase toutes les 2 ou 3 heures.
BIOFORCE SA, 9325 Roggwil
Produit suisse
200 ml
Bioforce

Label of Drosinula cough syrup.

The label, however, seems to show *D. spathulata*. A collaborator of that firm has told me that this picture originates from an earlier date and has only indirectly to do with the contents.

I don't know if the syrup is to be sold in other countries.

Addresses:
Bioforce South Africa Pty., Ltd., Benmore/-R.S.A.
Bioforce of America Ltd., Plainview N.Y./ USA
Bioforce Ltd., Troon. Scotland

CARNIVOROUS PLANT TISSUE CULTURE— PRESERVING OUR INTERESTS

by Ron Gagliardo
(1216 Cooper Dr., Raleigh, NC 27607)

Over the past couple of years, I have become very involved with plant tissue culture, both of CP and many other plants. Last year, as a freshman at North Carolina State University, I studied growth regulators in carrot cell tissue cultures and their effects on protoplast fusion. Needless to say, this made my first year of college most interesting. I have been working with many different CP in vitro in a home laboratory and with Dr. Bill Carroll of Chatham Botanical have been successful in cloning most genera of CP.

Tissue culture seems rare to me to be the superior method of propagating many rare plants in general, not only CP. However, I am most concerned with carnivores. I have started many cultures with seed, leaf cuttings and apical meristems It is important to keep rare species such as *Sarracenia oreophila, s. rubra* ssp. *alabamensis, Heliamphora,* and *Darlingtonia.*

With regard to sarracenia, I can attest to fast multiplication and overall vigor when grown in vitro. By initiating a culture with an apical meristem (growing tip) of an older sarracenia, it is possible to obtain flowering size in half the time normally required for plants grown from seed. Thus, many mature plants can be obtained quickly for possible reestablishment in depleted natural populations or sites. Tissue culture is also a good means of distributing CP to countries that have strict import requirements.

I am very interested in obtaining rare CP (in the form of seed, cutting or plants) for establishment in vitro. I have been concentrating on *Nepenthes* for a time. From what I can gather, the *Nepenthes* of Kinabalu, Sabah and other areas are falling fast in numbers. I am most interested in obtaining material of any rare species of these areas for tissue culture. I have been thinking of making some kind of proposal to the officials of Sabah National Parks as follows:

1) Produce in vitro any number of *Nepenthes* endemic to the area in order to re-stock the park.
2) Distribute selected plants to CP enthusiasts *only* after completion of the above.
3) Offer to pay an acceptable royalty to the Park on sales of selected excess stock after completion of above.

I have corresponded with a few of the most noted CP enthusiasts and growers from whom I have received general support for such a project. I would be very interested in the opinions of other ICPS members and anyone else interested in such a project. I am interested only in helping to perserve some of these rare species of CP. If there are better or more feasible methods or means of accomplishing this, then let's go with it.The most important thing now is to find the most viable solution for perserving our quickly disappearing carnivorous plants.

D. muscipula - burgundy traps.

COLOR VARIANTS OF

D. muscipula - rosetted heterophylla.

D. muscipula - rosetted pink.

DIONAEA MUSCIPULA.

Photos by J. Gold

D. muscipula - clumping cultivar.

Beginner's Corner

Carnivorous or Insectivorous Plants

by George Ashley

What are they? First they are a group of plants that are generally found growing in swamps or moist places, although this is not strictly so, as many are found in quite dry, stony, and sandy areas. They are found from sea level to quite high altitudes from the edge of the arctic circle to the tropics; indeed many are often covered with snow in the winter when they become dormant. They all have one thing in common, they trap and utilize the bodies of insects, in some cases small mammals and small birds. This is accomplished by various methods according to the various modified leaves developed by the different species of plants.

The first group of plants adopt the sticky fly paper type of trap. The upper surface of these leaves are covered with thin, hairy tentacles tipped with sticky red glands. The prey on coming in contact with these sticky glands becomes hopelessly trapped and the tentacles slowly envelope their prey. The soft body parts are dissolved by substances from the glands and finally absorbed by the plants. There are a number of plants that adopt this method of trapping their victims.

The Butterworts *(Pinguicula)* from the United States and the Northern Hemisphere, *Drosophyllum* from Portugal and *Byblis,* Australia, to the *Drosera* which is world wide, some 90 different Sundews are found in the world, of which 56 have been recorded in Australia. Four fifths of these are confined to the south western corner of Western Australia, nine species being found in Queensland, six within a few miles of Brisbane. The *Drosera* (Sundews) are found in many shapes and sizes from the small *Pygmea* 1 to 2 cm across, to the large *Drosera gigantea* 2 up to 100 centimetres tall which is somewhat like a small shrub.

Some of these *drosera* grow from tubers from the size of a small pea up to a tuber 2 to 2½ centimetres in diameter. Some tubers are a deep red in colour and some are white. Some of the *Drosera* are climbing plants often several feet in length.

Flowers range from white, through pink to a mauve colour, some yellow to a deep orange. Some are very small; one, the *Drosera pygmea,* has a flower barely 3 mm across, this has only four petals; all other *Drosera* have five petals. One other *Drosera* from West Australia, one of the *Pygmea* ones, has a lovely orange flower at least two centimetres across.

The leaves of *Drosera* also vary quite a bit from long lance shaped leaves as in *Drosera adelae* from North Queensland to small kidney shaped leaves on climbing erect types; others have fan shaped leaves.

Some propagate by runners like a strawberry plant, some grow small plantlets from detached leaves, others form tubers on the ends of advent roots, but mostly from seed. Some of the rosetted type produce their flowers before they grow their leaves; some have single flowers only; others a much branched stem with many flowers.

The next group has their leaves modified into a very effective trap such as the well known Venus Fly Trap of Carolina, U.S.A. The leaf is divided up the middle with a midrib. The edges of the leaves have spines, also the inner surface has several sensitive trigger hairs which are activated by the victim when it crawls over the surface. The two halves then close entrapping the victim

where the soft parts of the body are dissolved by fluids excreted by glands. This is then absorbed through the leaves into the plants; the leaves can then reset themselves and the hard undigested portions of the insect are discarded, being blown away by the breeze.

There is also a plant found in the freshwater swamps and lagoons of Northern Queensland, an Australian known as *Aldrovanda* or the Water-Wheel plant. It is completely submerged but it also catches its prey in a manner very similar to the Venus Fly Trap. There are also many different types of *Utricularia* in Australia. These are plants both aquatic and terrestrial that also catch their prey using a very efficient trap in the form of small bladders fitted with a very ingenious trap door. These plants also have some very lovely flowers somewhat like small snap dragons and are of many colours, pink, red, yellow, mauve or a deep purple, or blue. A large water hole covered with these flowers can be quite breath-taking.

The last group of plants is the Pitcher Plants. First we have the *Sarracenia* from America; these are bog plants and have a very large and colourful flower from yellow, bright red, orange or purple depending on the species. The leaves of these plants are modified into long narrow tubes and can be up to a metre high. The leaves of the prostrate types reach only a few centimetres in length. The leaves are often brightly coloured and some are beautifully veined, they are however a cunning trap to the unwary victims. They have scent glands which attract the victim to the edge of the pitcher where they can go so far and then fall down into the digestive juices, where they are prevented from climbing out by downward pointed hairs.

Next the *Nepenthes* also known as pitcher plants. These have the midrib of their leaves extended which develops into a pitcher complete with a lid. They also catch their prey like the *Sarracenias* and the pitchers range from very small to very large sizes, capable of holding up to a litre of liquid and these can be of many shapes and colours. *Nepenthes* can be of prostrate form to large vines often twenty or thirty feet in length climbing the trees in the rainforest where many of them grow.

Nepenthes have male and female flowers on different plants so to have seeds, one must have male and female plants flowering at the same time. They are also found growing from sea level to elevations of up to 2,650 metres in the cool moist heights of the mountains to the hot humid conditions of the tropical coasts. They are found from Madagascar to Southern China down to North Australia.

Lastly, we have the West Australian pitcher plant *Cephalotus follicularis* found in the South Western corner of West Australia. This is unique in being the only species and found nowhere else in the world. It is a small plant with rosettes of small pitchers close to the ground.

Culture: All carnivorous plants can be grown in a mixture of peat moss, sphagnum moss, some of the *Drosera* in sand with a little moss, kept moist, but must have good drainage using plenty of charcoal.

The articles appearing on pages 72-77 have been reprinted from *Sundew,* the journal of the Brisbane Carnivorous Plant Society of Australia. "Carnivorous or Insectivorous Plants" by George Ashley appeared in Vol. 2, No. 2, Sept-Oct 1982; *"Drosera binata,"* I. Gilbert, Vol. 2, No. 2, Sept-Oct 1982; *"Drosera indica,"* Bruce Pierson, Vol. 4, No. 1, July-Aug 1984; and "Layering and Repotting," I. Gilbert, Vol. 3, No. 5, Mar-Apr 1983.

DROSERA BINATA

by I. Gilbert
7 Bennelong St., Kedron, Queensland, 4031, Australia

Of the *Drosera* genus, one of the most commonly grown, and indeed one of the species depicted on the front cover of 'Sundew', is *Drosera binata*. Plants of the type form, now known as *D. binata* 'T Form', were first collected by the French expedition, along Australia's south coast, led by L'Entrecasteaux during 1792. The naturalist who accompanied the expedition, Sabillardiere, first described *D. binata* in 1808.

It is a wide spread species extending from Fraser Island southward along coastal south-east Queensland and in N.S.W. extending west as far as the north and south tablelands, the east and west coast of Victoria and inland along some river systems and ranges. Its most western extemity is in South-east South Australia where it occurs in coastal bogs and on Mt. Lofty Ranges. *D. binata* also occurs spasmodically throughout Tasmania and New Zealand.

D. binata requires continual wet acid conditions and naturally inhabits bogs and swamps. In the northern extremities of its growing habitat plants can have one to several short dormant periods during the cooler months. As the species extends south through more temperate areas the winter dormancy period lengthens. In the southern regions *D. binata* will go into dormancy during autumn and not re-appear until mid spring.

The species has been divided into one form and two varieties. The type form, *D. binata* 'T Form', is a hardy plant from the temperate zones. Although it is the smallest of the described sections 'T Form' may still exceed twelve inches in height. Many smooth cylindrical leaf stalks extend from the plant's central crown. Each leaf stalk divides into two, giving a forked or wishbone appearance. The flattened blades of the fork are covered from axis to tip with fine, red, mucilage tipped hairs. I have witnessed very little movement of leaf blades (such as with *D. capensis* etc.), however the dew-tipped tentacles become very active, when an insects comes in contact and make a most effective trap. The new leaves, which are produced from the centre of the crown, start as a tightly wound coil, then unroll much the same as a new fern frond does. Each division of the leaf unrolls in the same fashion thus protecting the tips until the leaf has fully matured. New suckers grow from the base of the plant's crown and may come up from any section of the plant's thick wiry roots. Many ½ inch white, five petalled flowers are bourne on tall racemes. The racemes often exceed twice the plant's height. Although described as a form, *D. binata* 'T Form,' is a genetically stable variety and will always germinate true to type.

By the original description by Darwin, of *D. binata* variety *dichotoma,* it would appear to be of the plant now referred to as the 'Giant Type.' Since the original description a 'Small Type' form has become common in cultivation. Both types of *D. binata* variety *dichotoma* are botanically similar to *D. binata* 'T Form', except that the mature leaf blades divide two or more times giving each leaf between two and eight tips. Often, in either type, an uneven division occurs (e.g. three tips on one side and two on the other). The 'small type'is similar in size and appearance to 'T Form' but usually a pale green colour. The 'Giant Type' which may exceed three feet in height is one of the largest plants in the *Drosera* genus. Its thick, branching flower racemes tower above the foliage height and bear numerous one inch diameter white flowers. Because of apparent differences between both growing habits and flowers of the 'Giant' and 'Small' type, botanists may yet sub-divide them into separate forms or varieties.

D. binata var. *multifida* normally occurs on the warmer northern habitats of the species growing range. It is larger but again vegetatively similar to the type form, except the leaves divide into six or eight segments and the tentacles are usually deep red. A form of this variety, called *"extrema",* which occurs in coastal and island swamps and marshes north of Brisbane, can develop over thirty leaf divisions. Leaves of this form both appear and work like a large spider's web.

Drosera binata

Another less common form of variety *multifida* produces attractive pink flowers, a very sought after plant by C.P. growers. Leaves of var. *multifida* are zygomorphic, the right side being a mirror image of the left. The latter two described varieties of *D. binata* retain the typical wishbone leaf form until the plant has reached maturity.

One of the easiest of *Drosera* to cultivate, *D. binata* makes a lovely multi-planting or basket specimen. Plant in broad shallow pots, to accommodate the large root system. A peat and sand medium is recommended. Position pots in strong light or growth will become weak and mucous won't be produced. Keep the medium wet to sodden during growth periods, and maintain some moisture during dormancy. Feeding with a weak organic fertilizer will help produce strong, healthy growths, but take care not to overdo it. A single plant of *D. binata* can catch and digest hundreds of moths, mosquitoes and other small insects, each growth season.

To propagate, take leaf cuttings or root divisions during the period from mid spring to early summer. Seed of *D. binata* should germinate easily without stratification, but if you're not succeeding, try placing seed in the fridge for two weeks before sowing. Sow seed from early to late spring.

References:

"Plants of Prey" by Rica Erickson
"Carnivorous Plants" by Adrain Slack

Drosera indica

by Bruce Pierson

Drosera indica is an annual species which is fairly easy to grow from seed. I sow the seed on a mixture of three parts peat, one part sand. The seed should be planted in early spring, to ensure the longest possible growing season for the plants. Germination can be slow, particularly if the weather is cool. It can be 4 to 8 weeks before the seed germinates, sometimes longer.

Seedlings seem prone to damping off, particularly if there is insufficient air circulation, so have good air circulation and a not too high humidity. A sunny position seems to suit this plant, with possibly 25% shading in the hotter months. My watering is by the tray method, with 10-20 mm of water in the tray being ideal. I grow 4-6 plants in a 100 mm pot.

Through the growing season, the plant will develop quite a long stem, which is very thin and offers no support to the plant, which will trail along anything in its path. The stem will reach 4.5 cm or longer in the growing season with leaves 1.5 cm long. The flowers are borne on a separate stem to 2.5 cm long, bearing as many as 12 flowers. After setting, the seed will ripen slowly, starting with the pod nearest the stem.

The growing season for this plant is from mid-late spring, until late autumn-early winter. Propagation is by seed only, which must be collected as it ripens, and stored in the fridge until next season (seed falling into the pot will generally remain dormant). At the end of the growing season, the plant will decline and die, dependent on its seed to carry the species on.

LAST CHANCE!

Anyone wishing to be *excluded* from the ICPS directory should notify Pat Hansen *immediately:* 3321 Hamell Road, Fullerton, CA 92635.

Layering and Repotting

(taken from a talk by Ian Gilbert)

Though many people have varied ideas on repotting, Ian Gilbert was to show us his methods.

He first stressed the need to have a good range of pots and potting mediums on hand. Having mixed his own general potting mix, consisting of two parts peat moss, one part sand, one part chopped sphagnum moss, one part polystyrene (the polystyrene used to open up and lighten the mix) and a little Osmocote, well agitated for a consistent mix, and making sure to break up any lumps of peat moss, as they may later create fungal problems, he proceeded to repot a Sarracenia, advising us that there was no need to molly-coddle our plants.

First placing some polystyrene in the bottom of the pot to avoid the roots clogging drainage holes, which may cause problems of the mix staying too wet, souring and a possible problem with *Phytophora,* he filled the pot to about two-thirds and spreading the roots of the *Sarracenia* across the surface of the mix, he then topped up the pot. After trimming away unwanted pitchers, check for correct name tag and mark the date of last repotting. When potting out seedling Burmanii into grow tubes, he just placed a little styrene in the base of the tube and having filled the tube with mix, poked a small hole in the top, placed the new plants on and firmed them down. Again, check tag for name and date of potting.

Be sure to water fairly quickly or the plant will dehydrate in the new dry mix. Also be sure when repotting not to leave the roots exposed to the air for too long. This should ensure a low mortality rate.

The only plants he grows sitting in water are his Utricularia, all others are left to get plenty of air to the roots.

The other thing of use to C.P. growers is layering, the two forms being ground and aerial layering.

When ground layering with an arching branch as those of *N. gracilis,* lay the branch across another pot of mix, first having sliced the timber half way through on a slight angle just below a leaf node, using a sharp blade and holding that slice open with a piece of plastic. Pin down the branch across the mix and wait for new roots to fill the pot, when the new plant can be cut from the parent.

Aerial layering is similar. Having placed plastic in the sliced timber to keep it open, make a small plastic envelope around the slice and fill with sphagnum, close the envelope and wait for the envelope to fill with roots. When this has happened, using a small plastic pot with a hole pre-cut in the bottom and sliced up the side, fit the pot around the branch of the parent plant and fill the pot with mix. Now wait for the pot to fill with roots, when the new plant can be separated from the parent.

Plants may be layered off every node, but, in both cases of layering, a period of three to four months may elapse before the plant has a good root system, and is ready to be separated.

Sarracenia flava
Near Pensacola, Florida

Drosophyllum lusitanicum

Bruce Pierson
(P.O. Box 179, Albion Park, NSW 2527, Australia)

Drosophyllum lusitanicum can be easily grown by using the following method. I use a 150 mm plastic pot, with a compost of 2 parts peat, 2 parts potting mix (any good commercial type) with the course material sifted off, and 1½ parts horticultural sand. Before placing this mixture in the pot, line the drain holes with sphagnum moss, as this acts as an indicator, and retains the potting medium.

Stand the pot in 115 mm of water, and take 3 seeds, and nick a small piece out of the blunt end. Plant the seeds near the centre, about 3 mm deep. Cover the pot with a sheet of cardboard, and place a sheet of glass over this. The seed normally germinates in about 4-6 weeks at a temperature of approximately 24 C. Keep a close check on the seed, and when it germinates, remove the covers, and place the pot in a well lit area, out of direct sunlight.

Once the plants are approximately 25 mm high, remove the pot from the water tray, and place it on a bench. By watching the sphagnum moss in the drain holes, you will be able to tell when to re-water the pot. As the moss gets drier, it will become lighter in colour. Do not let the pot become too dry, as the plant may die. To water the plant, place the pot back into the water tray for about ½ hour, and then remove it back onto the bench.

Once the plants are about 100 mm high, a few rocks may be placed in the pot, along with a little sand, to dress up the pot. The plants may now be gradually exposed to some sunlight, but do not overdo it at first; some morning sun is usually quite adequate. Remember that the pot will dry out much quicker in warm weather, and may need watering daily, whereas in cool weather, every few days will be adequate. The plants will flower in their second year of growth.

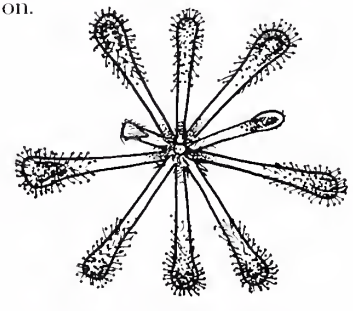
A few important points worth mentioning are, never transplant this species, as it will result in the early death of the plant, and do not water the pot from above, as this may cause rotting of the stem at ground level. With due care, this species can prove to be easy to grow in cultivation.

Drosera montana

Bruce Pierson

Drosera montana is an easily grown plant for its first season of growth. After flowering, this species tends to go dormant, often failing to recover in the following season, or if it does, a much smaller. inferior plant seems to result. I find it best to treat this species as an annual, planting seed each season, or taking leaf cuttings. Both methods of propagation prove very successful, and the plants will grow quickly through the spring.

A variety of potting mixes seem quite suitable, ranging from peat to 2 peat 1 sand, or anything in between. Watering is by tray, with a depth of approximately 20 mm being satisfactory. A 100 mm pot will accommodate up to 4 plants quite easily. This species is very similar to *D. spathulata* Kanto type, and with its white flowers and slightly pinker tone, it is a plant worthy of inclusion in any collection.



Drosera montana
Drawing by Ron Fleming

The following are translations of the photo captions in a Japanese book dealing with carnivorous plants. The translations were done by Yasuhiro Fukatsu (49, Ohkan-dori, Hacchocho, Okazaki-City, Aichi-Pref. 444, JAPAN). See *CPN,* March 1984, pp. 16-22 and June 1984, pp. 46-50.

サボテン・多肉・食虫植物

CACTI, SUCCULENTS AND INSECTIVOROUS PLANTS
by I. Kusakabe

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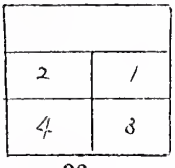

1. デオニア — *Dionaea muscipula*
2. ピングイクラ・コリメンシス — *P. colimensis*
3. ネペンテス・ビロサ — *N. villosa*
4. ネペンテス・ベントリコーサ — *N. ventricosa*

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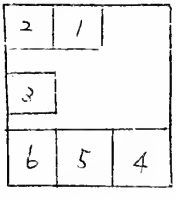

1. コウシンソウ — *P. ramosa*
2. ナガバモウセンゴケ — *D. anglica*
3. ドロソフィルム — *Drosophyllum lusitanicum*
4. ネペンテス・ミラビリス — *N. mirabilis*
5. ネペンテス・ペルビレイ — *N. pervillei*
6. ネペンテス・マダガスカリエンシス — *N. madagascariensis*

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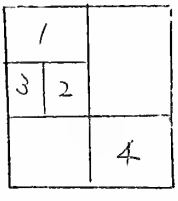

1. ネペンテス・ベントリコーサ — *N. ventricosa*
2.3. ネペンテス・アラータ — *N. alata*

This is the most popular species and many varieties are cultured. Right one is often taken for *N.* × *hybrida.*

4. ネペンテス・ドルマンニアナ — *N.* × *dormanniana*
(N. mirabilis × *N.* × *sedenii)*

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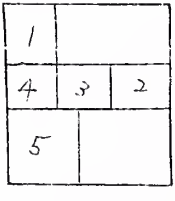

1. ネペンテス・マスターシアナ — *N.* × *mastersiana*
2. ネペンテス・ミナミエンシス — *N.* × *minamiensis*
3. ネペンテス・オーイソエンシス — The lower pitcher of *N.* × *oisoensis*
4. — The upper pitcher of *N.* × *oisoensis*

This is often taken for *N.* × *mixta.*
N. × *oisoensis* is *N.* × *mixta* × *N. maxma.*

5. ネペンテス・パラディサエ — *N.* × *paradisae*
(N. mirabilis × *N.* × *hookeriana [?])*

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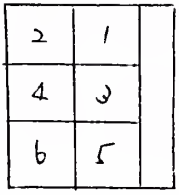
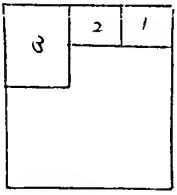


1. ネペンテス・マキシマ — *N. maxima*
2. ネペンテス・ソレリー — *N. thorelii*
3. ネペンテス・ブルケイ — *N. burkei*
4. ネペンテス・ラフレシアーナ — *N. rafflesiana*
5. ネペンテス・インターメディア — *N. × intermedia*
   (N. gracilis [?] × N. rafflesiana)
6. ネペンテス・ヘンリアナ — *N. × henryana*
   (N. × sedenii [?] × N. × hookeriana)

page 99



1. ネペンテス・ロッコー — *N. × rokko*
   (N. thorelii × N. maxima)
2. ネペンテス・ビローサ — The female inflorescense of *N. villosa*
3. ネペンテス・ダイエリアナ — *N. × dyeriana*

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above — *Heliamphola nutans*

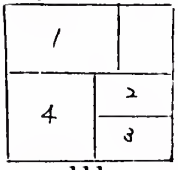
below — Top of Mt. Kinabalu in Borneo

page 105 *Cephalotus*

page 108 *Aldrovanda vesiculosa*

page 109 *Drosophyllum lusitanicum*

page 110



1. モウセンゴケ — *D. rotundifolia*
2. ナガバノイシモチソウ — *D. indica*
3.
4. ドロセラ・フィリフォルミス — *D. filiformis*

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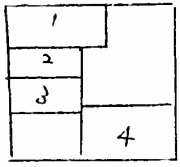

1. ドロセラ・ハミルトニー — *D. hamiltonii*
2. ドロセラ・ビナタ — *D. binata*
3. ドロセラ・ビナタ・ムルティフィダ — *D. binata multifida*
4. ドロセラ・アデラエ — *D. adelae*

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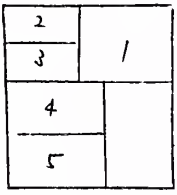

1. ドロセラ・マクランサ — *D. macrantha*
2. ドロセラ・ミクロフィラ — Flowers of *D. microphylla*
3. ドロセラ・ヌメロサ — *D. ramelosa*
4. ドロセラ・ブルボサ — *D. burbosa*
5. ドロセラ・エリスロリザ — *D. erythrorrhiza*

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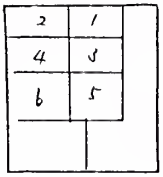

1. ドロセラ(バーミュラー・ピンク) *D. sp* (Bermullah-Pink)
2. ドロセラ・パレアケア *D. paleacea* with gemmas
3. ドロセラ・プルケラ *D. pulchella*
4. ドロセラ・レウコブラスタ *D. leucoblasta*
5. ドロセラ(ミルブルック・ホワイト) *D. sp* (Milbrook-White)
6. ドロセラ・スコルピオイデス *D. scorpioides*

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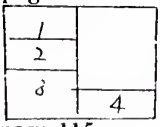

1.2. タヌキモ *U. vulgaris*
3. マルバミミカキグサ *U. striatura*
4. ミミカキグサ *U. bifida*

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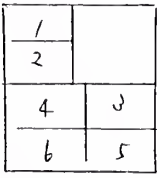

1.2. ウメバタイプレニフォルミス *U. reniformis*
3. ウ・リビダ *U. livida*
4. ウ・アルピナ *U. alpina*
5. ウ・サンダーソニィ *U. sandersoni*
6. ウ・メンジェシー *U. menziesii*

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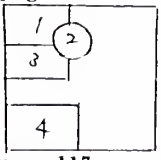

1.2. ピングイクラ・コーダタ *P. moranensis* (syn *P. caudata*) —tetraploid
3. *P. moranensis*—diploid
4. ムラトリスシレ *P. vulgaris*

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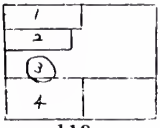

1.2. ピ・ジプシコーラ *P. gypsicola*
3.4. ピ・コリメンシス *P. colimensis*

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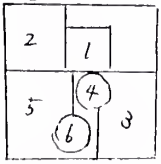

1. ピ・ルシタニカ *P. lusitanica*
2. ピ・アルピナ *P. alpina*
3.4. ピ・プミラ *P. pumila*
5.6. ピ・グランディフロラ *P. glandiflora*

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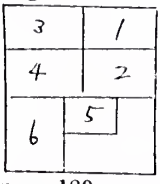

1.2. ビブリス・ギガンテア *Byblis gigantea*
3.4. ビブリス・リニフロラ *B. liniflora*
5.6. セロデンドロン・ゴルゴニアス *Roridula gorgonias*

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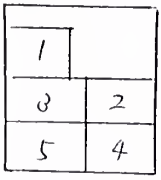


1. ド・エリスロリーザ *D. erythrorrhiza*
2. ド・プロリフェラ *D. prolifera*
3. ド・ディールシアナ *D. dielsiana*
4. ド・ペティオラリス *D. petiolaris* (hairless type)
5. *D. sp*

Review of Recent Literature

Almborn, O. Pitcher plant, Sarracenia purpurea, naturalized in Sweden. Sven. Bot. Tidskr. 77 (4): 209-216 1983

Andreas, B.K., G.E. Host. Development of a Sphagum bog on the floor of a sandstone quarry in northeastern Ohio. Ohio J. Sci. 83 (5): 246-253 1983. After a 70-yr. period of bog forming in an old sandstone quarry, there are 35 species of vascular plants and 5 species of Sphagnum. *Drosera rotundifolia* is one of the rare herbs found in this minerotrophic system.

Anon., 1984, Michael Sarrazin, 1659-1735. Canadian Numismatic Journal 29:191. This brief one page article is a short biography on Sarrazin who is the namesake for the genus *Sarracenia,* and appears in this coin journal since the species *S. purpurea* appeared on the one cent piece of Newfoundland a hundred or so years ago. Sarrazin was a surgeon and like so many medical men of the time took time out to study the natural history of the New World. In addition to the pitcher plant, he also studied zoological specimens such as the seal, porcupine and beaver, and collected over 200 plants to be sent to the Royal Gardens in France. In 1735, he died of "ship's fever" while attending the ill in an early Canadian hospital. In 1954, *S. purpurea* was designated the official flower of Newfoundland.

Bender, Steve. 1984. Carnivorous plants even the score. Southern Living 19:72-74 (June). A popular article briefly outlining the kinds of carnivorous plants in the south and their trap functions. The article also makes a strong case for conservation. A prominent feature is 8 full color photographs of excellent quality (photos by Van Chapin and Mary-Gray Hunter).

Bosserman, R. Elemental composition of Utricularia and periphyton ecosystem from Okefenokee swamp. Ecology 64 (6): 1637-1645. 1983. The above ecosystem was most productive in the spring and fall and least productive in the summer as far as the elemental composition (% dry mass) was determined. These results correlated with environmental parameters and fluctuated as conditions changed.

Buckley, D. Nature's 'meateaters'. Sacramento Union, May 5, 1984. A brief article describing several species of most common CP along with instructions for growing them.

Goldsworthy, A. The Cell Electric. New Scientist, April 26, 1984. The author compares the action potential of animal membranes to that of primitive plant cells. Primitive action potentials may have evolved first in plants to enable the cell to short circuit the voltage across the membrane so that damaged membranes could be repaired. In some plants such as *Dionaea, Drosera,* and *Mimosa,* the action potential evolved into a method of rapid communication with other cells so that a plant can trap insects or avoid being eaten by animals *(Mimosa).*

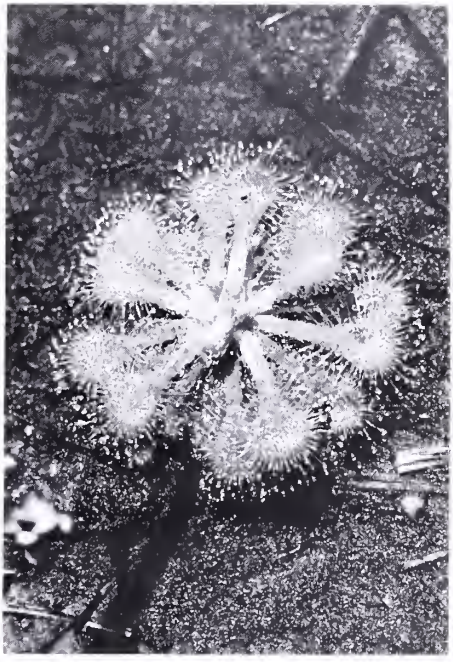
Hinds, HR. 1984. Additions to the flora of Cape Breton Highlands National Park.. Rhodra 86:67-71. Among non-CP species noted in the above location, *Pinguicula vulgaris* and *Drosera rotundifolia* are listed, the latter being new to the Province of Nova Scotia. DES

Kurata, S. New species of Nepenthes from Sulawesi, Indonesia. Journ. Insect.Plant Soc. 35 (2): 41-45 1984. Three species of *Nepenthes* were found. They are: *N. eymai,* named after the collector P.J. Eyma; *N. rubro-maculata* and *N. dentata* which was also previously desribed in Gardens' Bulletin 36 (2): 197-200 1983. These three species are the same plants as desribed above by Thurnbull & Middleton.

Rogers, R. In West Virginia's Wetlands-Carnivores trap unwary insects. West Virginia 47 (2): 31-32 1983. Three types of plants are found in W. Virginia, *Drosera rotundifolia, filiformis* and *intermedia.* There are also *Sarracenia purpurea* and *flavia.* Finally, there are 4 species of *Utricularia* which author describes in detail.

Turnbull, J.R., A.T. Middleton. Three new *Nepenthes* from Sulawesi Tengah. Reinwardtia 10 (2): 107-111 1984. From the high mountains forests of Central Sulawesi, three new species of *Nepenthes* were found. They are: *N. glabratus,* named for the lack of pubescent hairs on the vegetative parts of the adult plants; *N. hamatus,* named for the claw-like appendages attached to the peristome and *N. infundibuliformis,* named for the funnel-shaped pitcher.

Windler, D. A water plant with a taste for tiny beasts. Smithsonian Magazine, Spring 1983. *Utricularia* has a peculiar anatomy unlike most plants in which the position of the meristem determines the type of structure into which it will develop. In this aquatic CP, any meristem may develop into one structure and then change into another. This gives *Utricularia* a maximum flexibility to adapt in detail the mechanism of the trap and the means by which the plant reproduces by sexual and asexual methods.



Drosera capillaris
Mississippi

WANT ADS

When submitting Want Ads, please be sure to print clearly for best results and to eliminate mistakes. Please circle the correct letter before each item (Want, Trade, Sell or Buy). Want ads are limited to carnivorous plants, terrariums, greenhouses and moss. There is a charge of ten cents per item, with no limit to the number of items you may submit per issue.

Send coin or check to:
Arboretum, Want Ads
California State University
Fullerton, CA 92634

The Chicago Botanic Garden, P.O. Box 400, Glencoe, IL 60022, offers a "Plant Fact Sheet", *Selection and Care of Carnivorous Plants,* at bulk rates. Contact Charles A. Levine for rate information.

Robt. Kresanek, Hermann-Brill-Str. 38, 6200 Wiesbaden, Germany: (WT) for unusual and rare Drosera or sell: Sabah and North Sumatra Nepenthes—seeds/seedlings; photos of *N. villosa, N. pilosa, N. tentaculata, N. stenophylla, N. macrovulgaris, N. fusca, N. bicalcarata, N. ampullaria, N. reinwardtiana, N. spectabilis, N. treubiana, N. tobaica, N. pectinata.* First photo $1, each further one 50¢ incl. air mail postage.

Johannes Marabini, Am Grundla 24, 8522 Herzogenaurach, Germany: (T) *Genlisea hispidula* for *Drosera falconeri* or *Nepenthes rajah.* (T) *Nepenthes lowii* for *N. rajah.* (T) *Nep. treubiana, N. macfarlanei, N. tobaica*—seedlings.

Geoff Roberts, P.O. Box 132, Blackwood, S.A. 5051, Australia: Sell or trade tissue cultured plants of *D. regia, D. schizandra,* 20+ different pygmy drosera plus many more. Send S.A.E. plus 2 postal coupons for complete list.

Wilson Yeo, P.O. Box 626, Lim Ah Pin Road, Singapore 9154. Exporters of Nepenthes species (Malaysia).